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(54) A method of image formation.

(57) A method of image formation is provided, wherein a recording material is subjected to imagewise heating substantially in the absence of water and a base or precursor thereof, wherein the recording material comprises a support having coated thereon a 1,3-sulfur-nitrogen-containing compound capable of being cleaved in the presence of a silver ion or silver complex ion, an organic silver salt and a thermal solvent, and wherein the 1,3-sulfur-nitrogen-containing compound is represented by the following formula.

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aging is carried out at temperatures of normally 25 to 50 °C, preferably 30 to 45 °C for periods of normally 12 hours to 1 month, preferably 1 day to 2 weeks. In the light-sensitive material containing a 1,3-sulfur-nitrogen-containing compound and a base or base precursor, a mobile dye forming reaction can take place even during this storage for improvement in the degree of hardening, which leads to a considerable tendency toward image quality deterioration such as increased fogging.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a new thermal recording material or new heat-developable light-sensitive material which works on the basis of chemical reaction of silver ion and 1,3-sulfur-nitrogen-containing compound.

It is another object of the present invention to provide a thermal recording material or heat developable light-sensitive material which offers improved image quality, particularly improvement in image discrimination.

It is still another object of the present invention to provide a new positive-type heat-developable light-sensitive material.

It is yet another object of the present invention to provide a heat-sensitive recording material or heat developing type light-sensitive material which undergoes little deterioration in image quality during long-term storage.

The present inventors found that reaction takes place between an organic silver salt and a 1,3-sulfur-nitrogen-containing compound in the presence of a thermal solvent, and substantially in the absence of water and base, and that the use of this reaction makes it possible to obtain a recording material accomplishing the objects described above.

Accordingly, the objects described above have been accomplished by a recording material wherein at least a 1,3-sulfur-nitrogen-containing compound capable of being cleaved in the presence of silver ions or water-soluble silver complex salt, an organic silver salt and a thermal solvent are coated on a support.

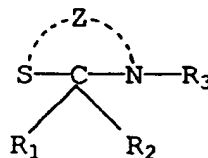
The recording material is capable of forming visible images upon imagewise heating substantially in the absence of water and base. This recording material is embodied as a heat developable light-sensitive material by adding a light-sensitive silver halide. When the recording material is embodied as a heat developable light-sensitive material, images can be formed by subjecting it to imagewise exposure, after which or simultaneously with which it is subjected to heating substantially in the absence of water and base.

The present invention is hereinafter described in detail.

DETAILED DESCRIPTION OF THE INVENTION

The 1,3-sulfur-nitrogen-containing compound of the present invention is preferably represented by the following formula 1.

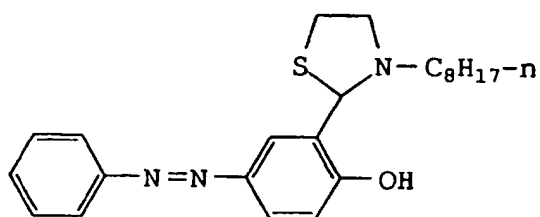
Formula 1



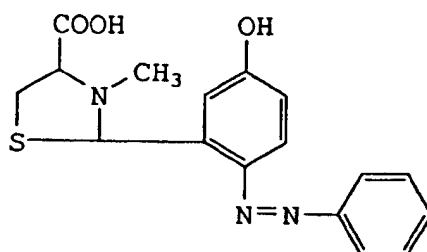
wherein R_1 and R_2 independently represent a hydrogen atom, aliphatic group, aromatic group or heterocyclic group. R_3 represents a hydrogen atom, aliphatic group, aromatic group, heterocyclic group or acyl group. Z represents a group of non-metallic atoms necessary to form the ring, which ring may have a substituent thereon. Z may cooperate with S-C-N to form a condensed ring. At least one of R_1 , R_2 , R_3 and the substituent on the ring formed by Z is a photographically useful group (PUG) or precursor thereof released upon reaction of the compound of Formula 1 with a silver ion or silver complex ion under heating. Either of R_1 and R_2 is preferably other than a hydrogen atom, and R_3 is preferably other than a hydrogen atom.

It is therefore possible to release the desired compound by choosing an appropriate substituent in the compound of Formula 1 and heating in the presence of an organic silver salt. Also, the immobility (diffusion resistance) and solubility of the compound of Formula 1 can be regulated by choosing an appropriate

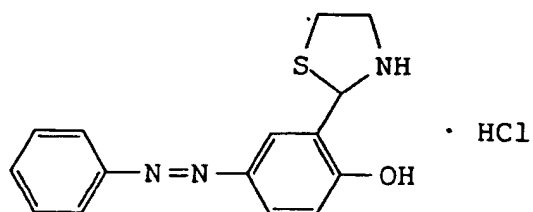
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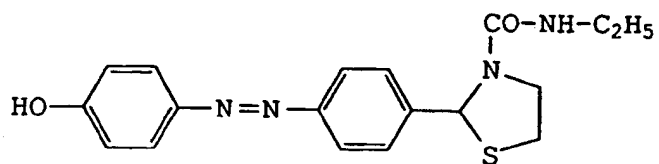
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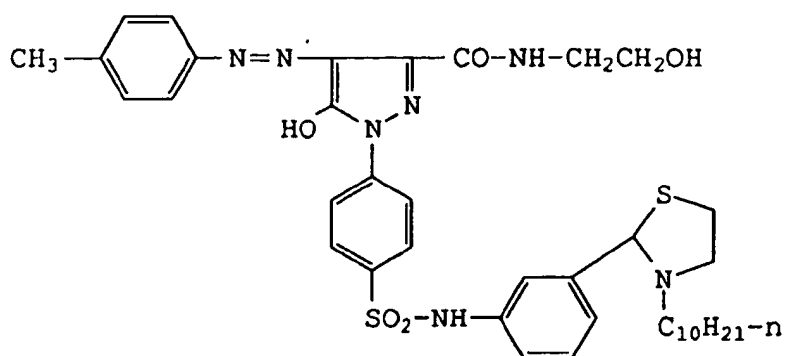
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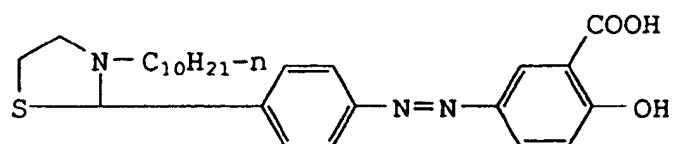
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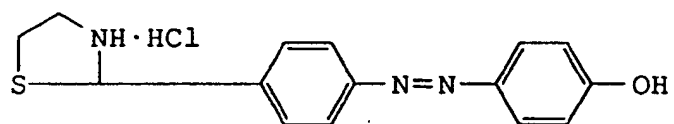
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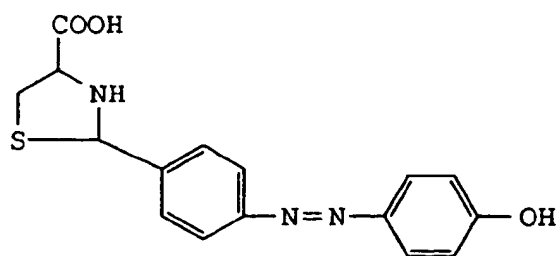
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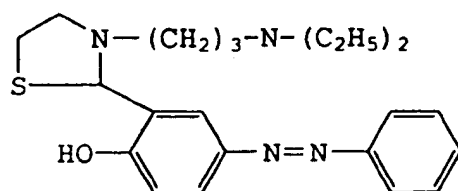
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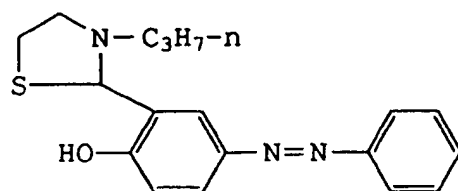
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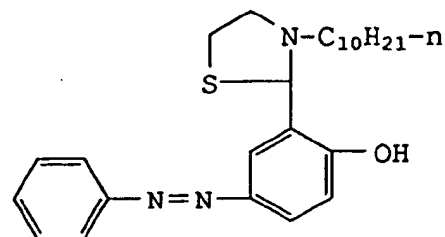
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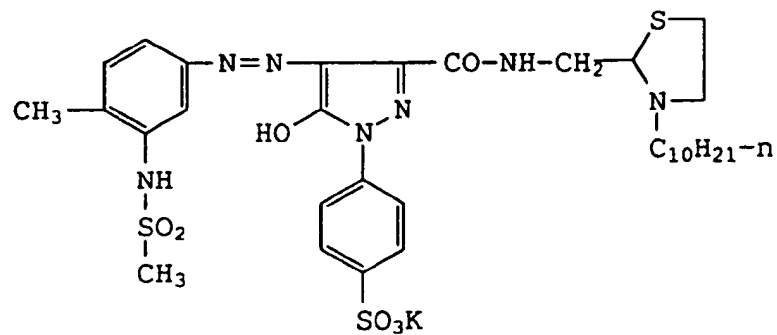
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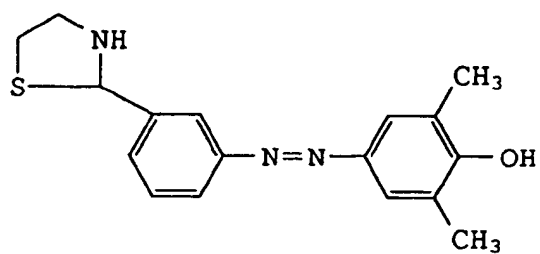
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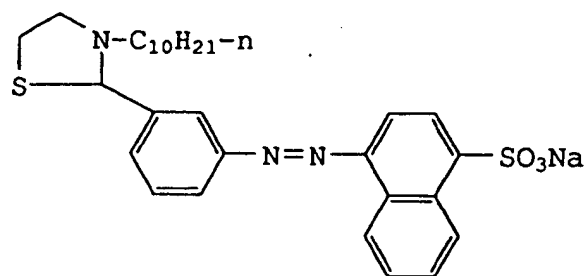
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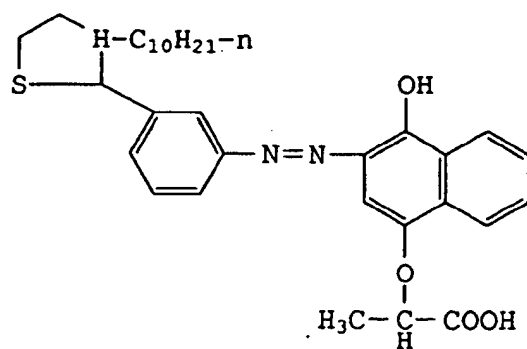
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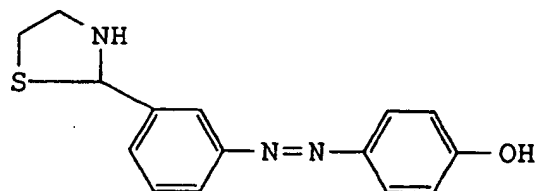
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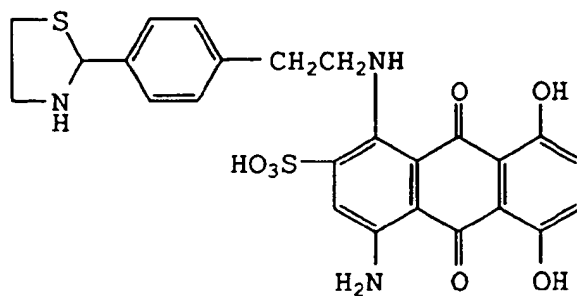
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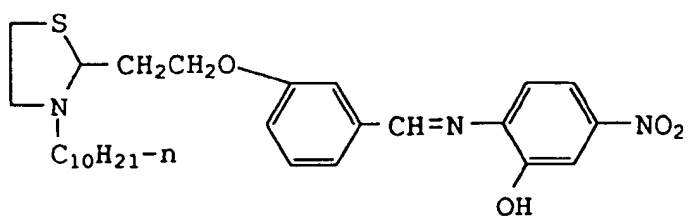
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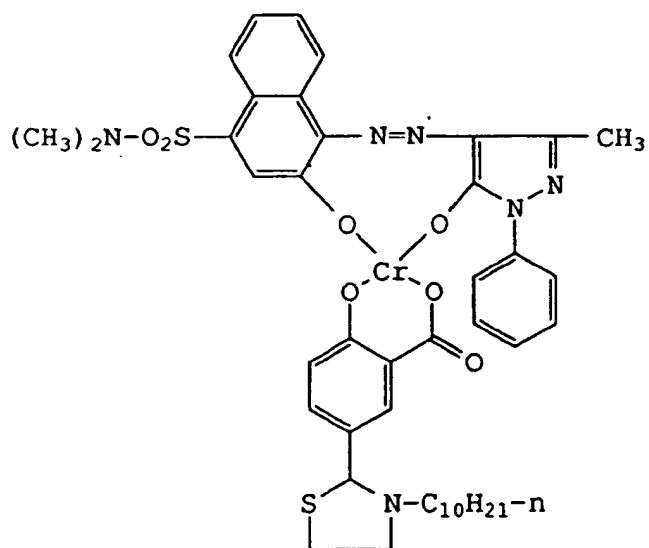
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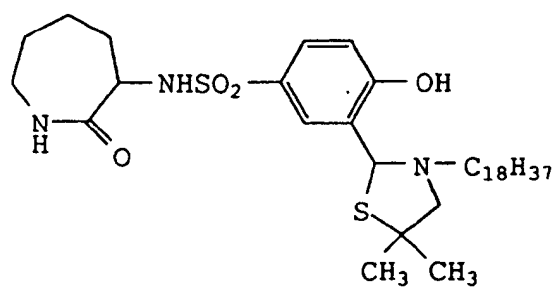
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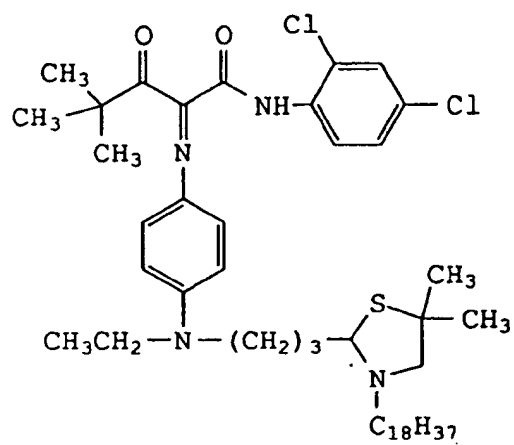
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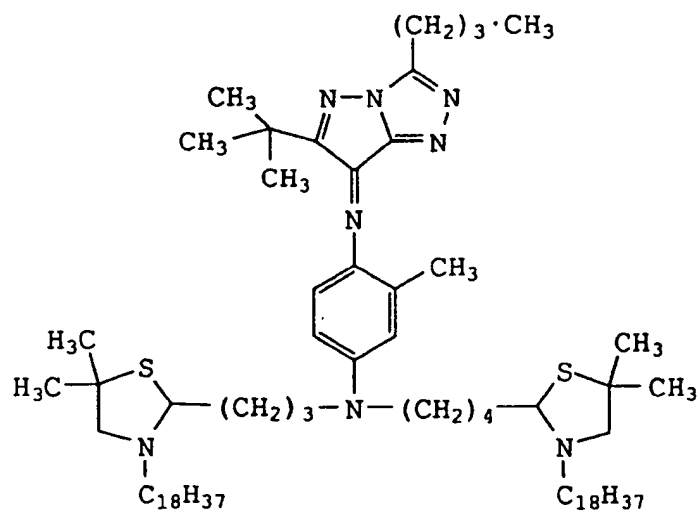
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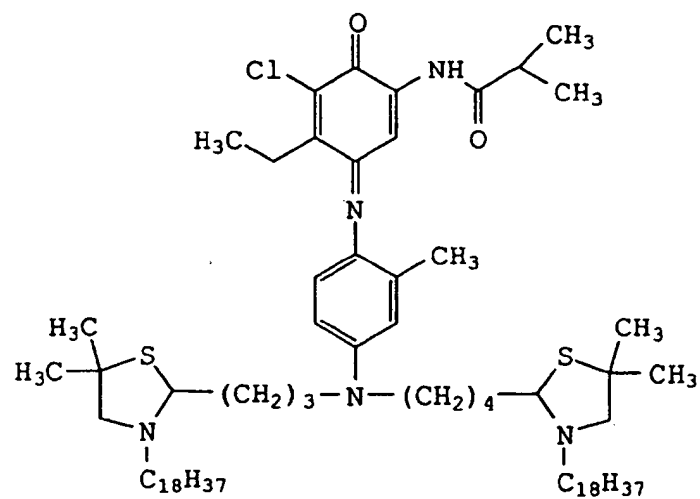
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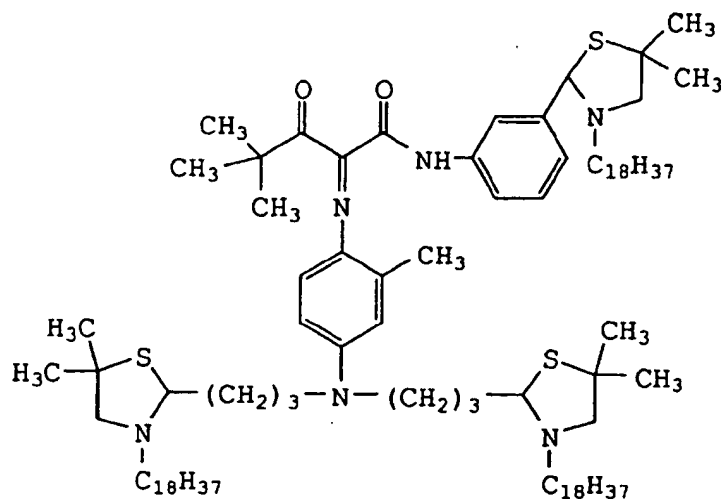
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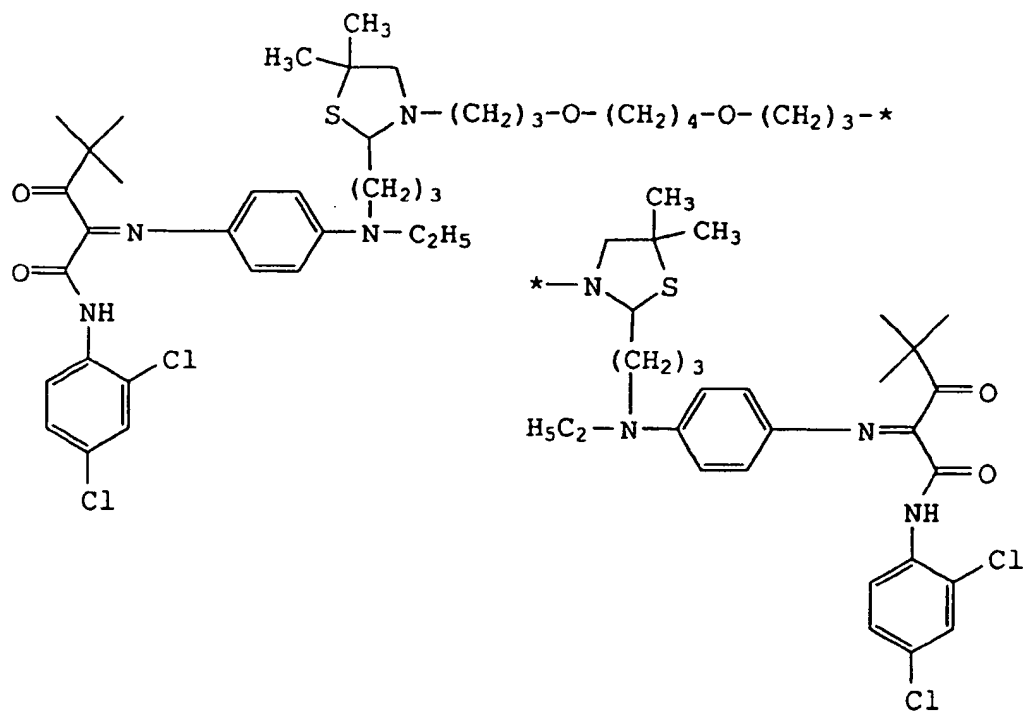
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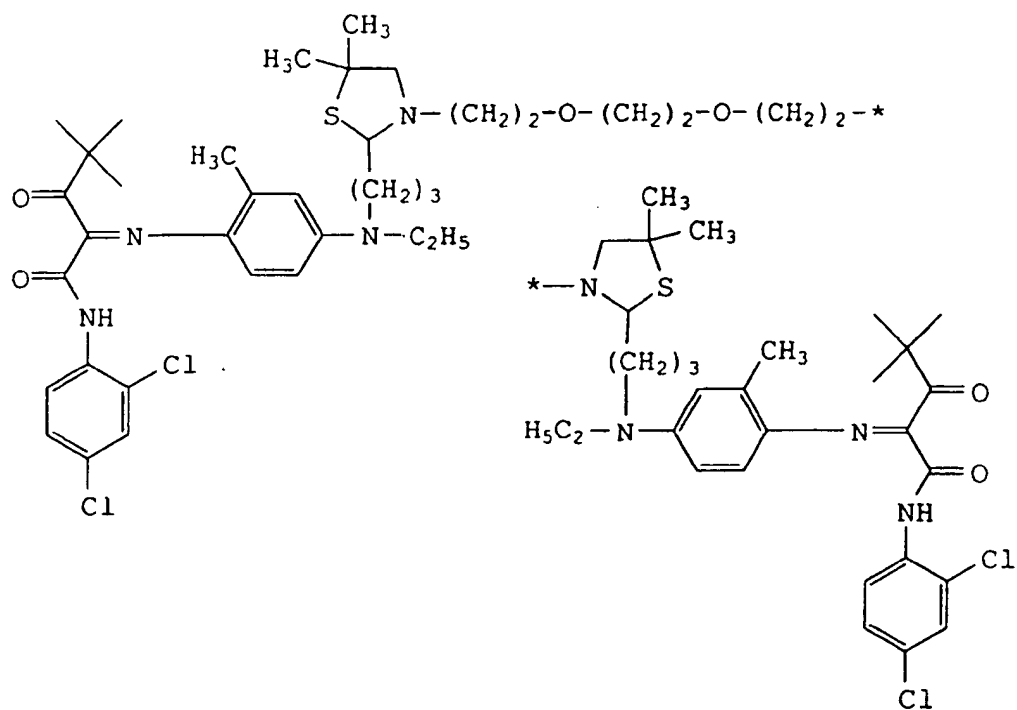
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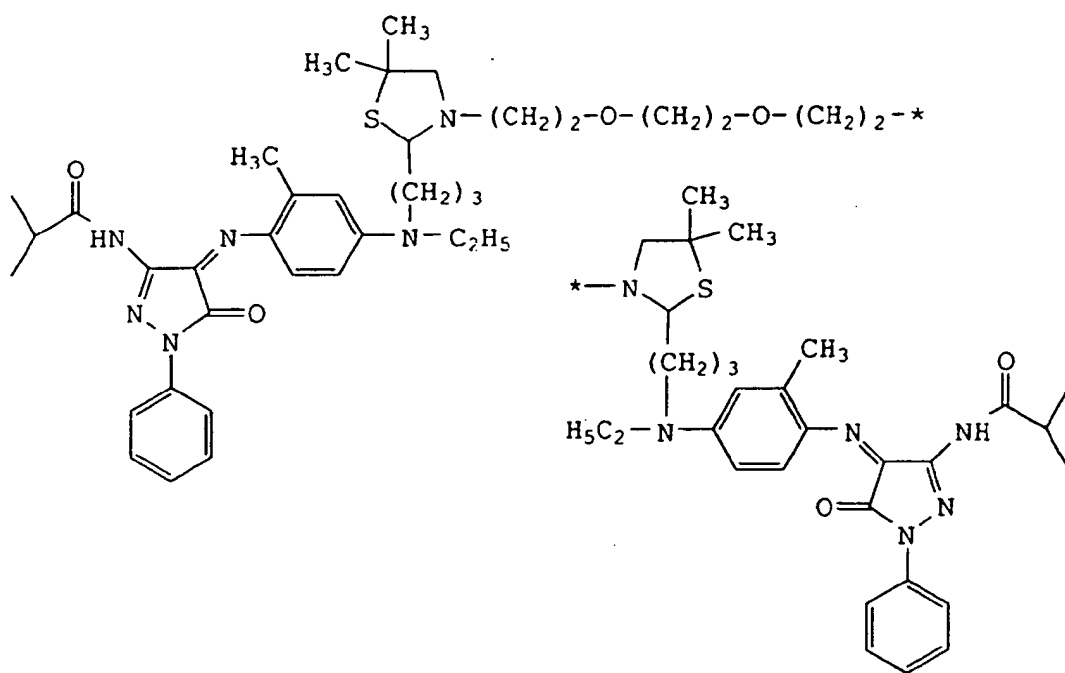
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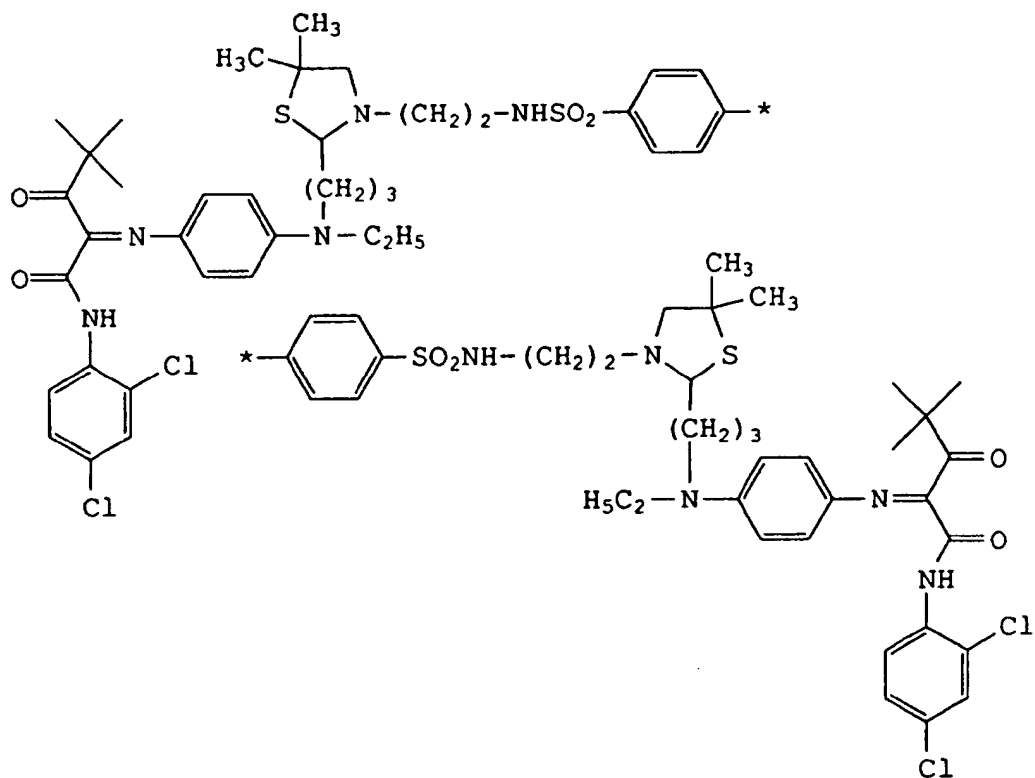
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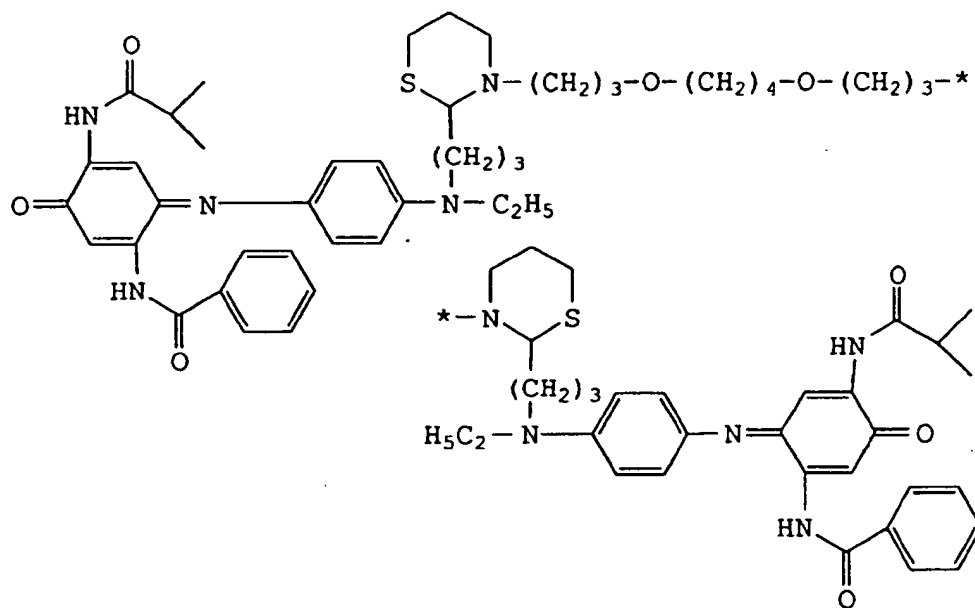
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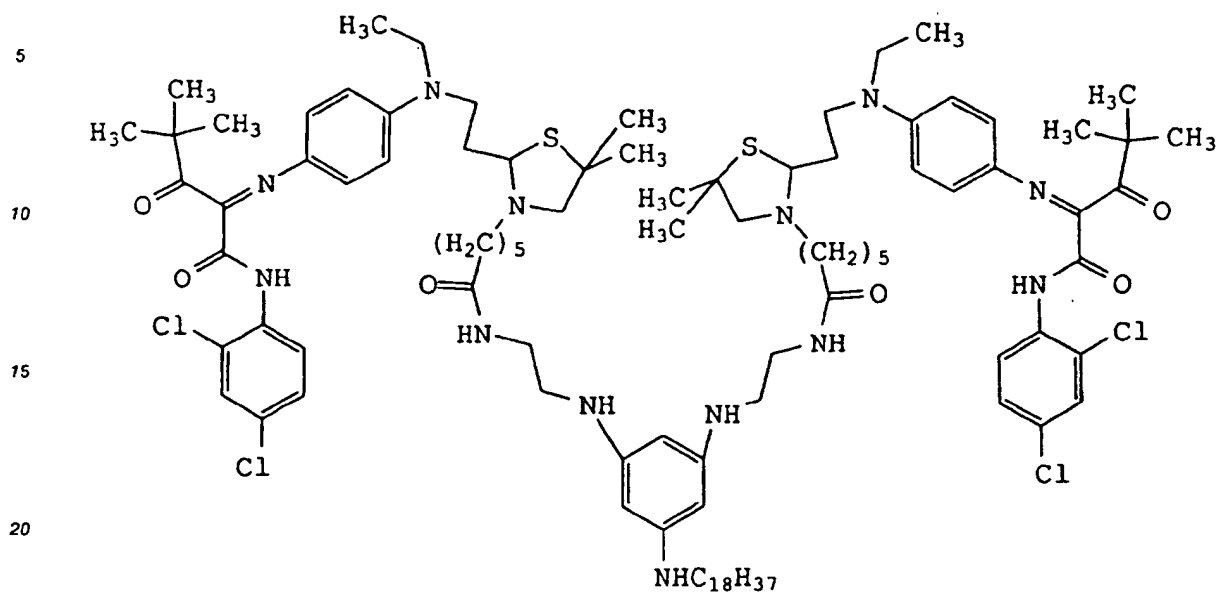
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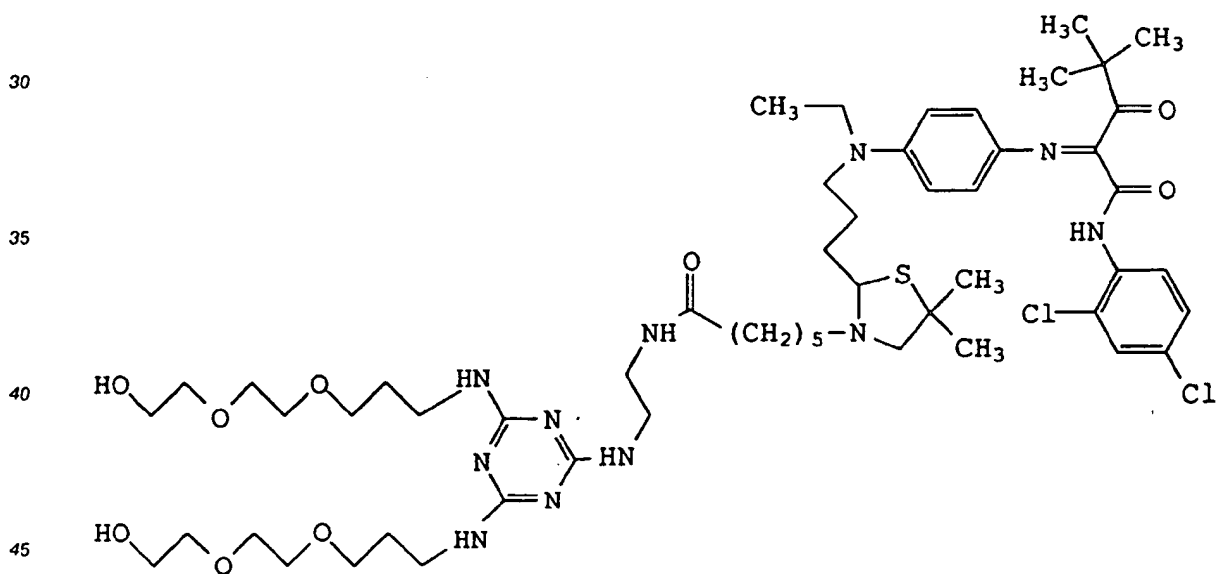
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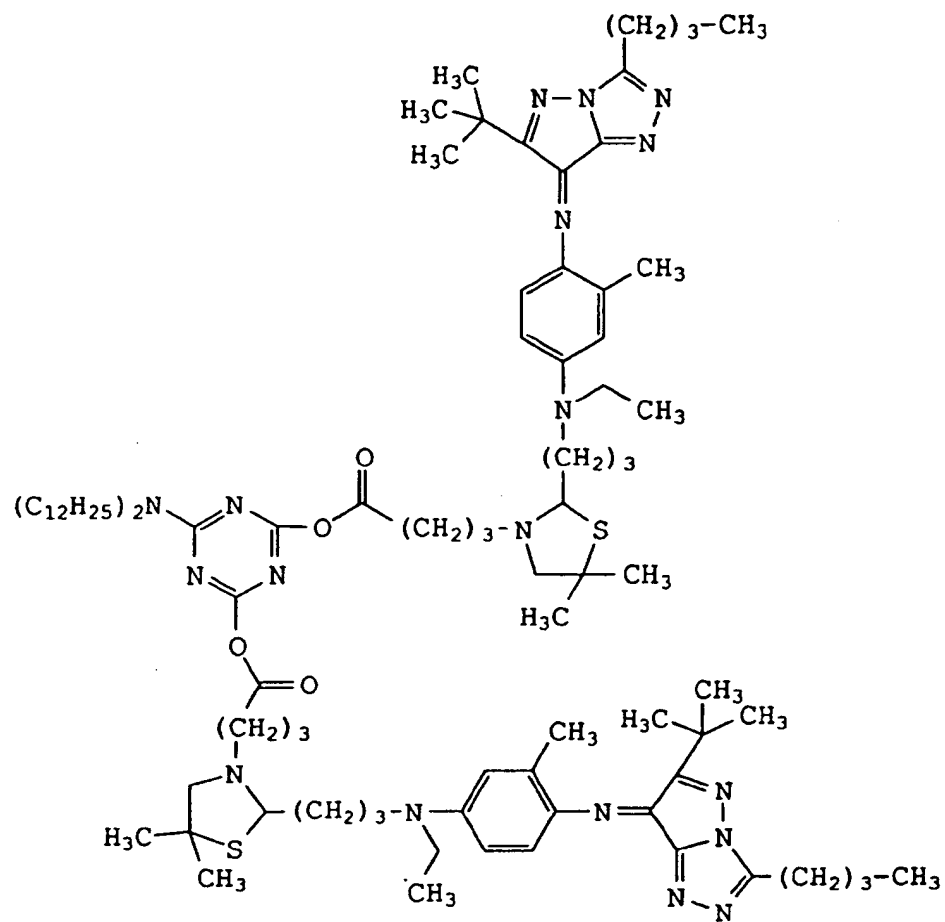
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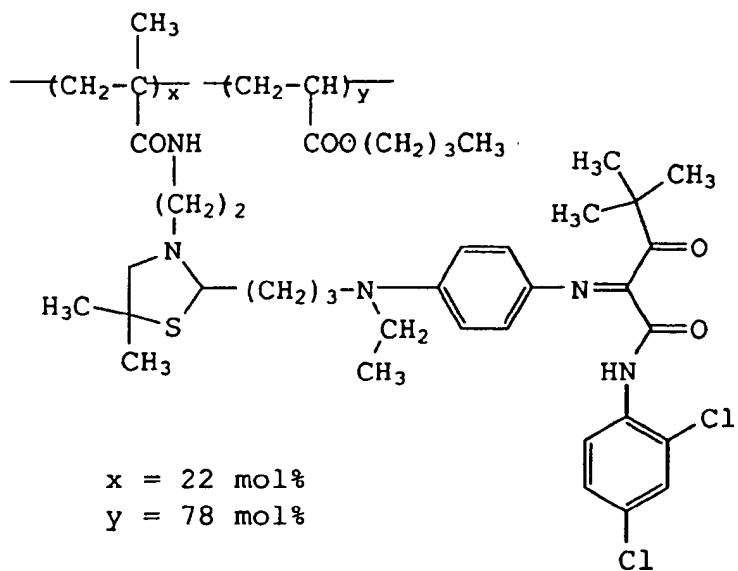
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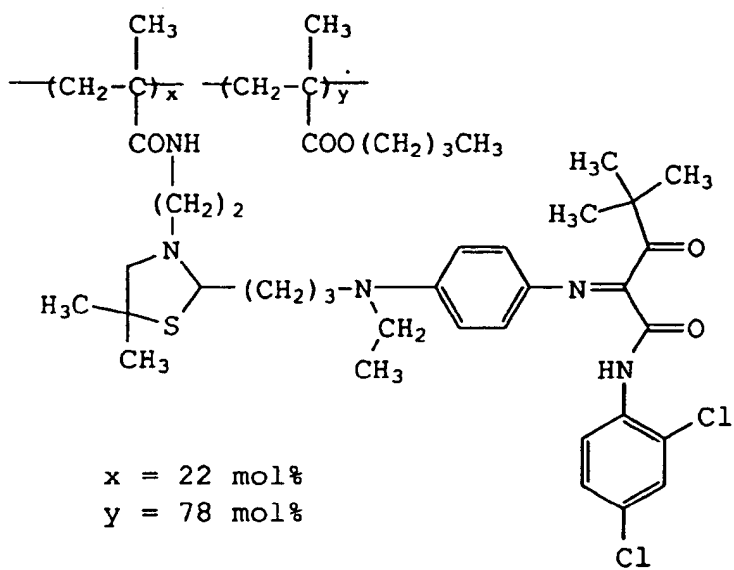
(62)



(64)



(65)



Examples of silver salts having an imino group include benzotriazole silver, which may be substituted or not. Typical examples of substituted benzotriazole silver include alkyl-substituted benzotriazole silver, alkylamidobenzotriazole silver, alkylsulfamoylbenzotriazole silver, halogen-substituted benzotriazole silver salts, alkoxybenzotriazole silver, 5-nitrobenzotriazole silver, 5-aminobenzotriazole silver, 4-hydroxybenzotriazole silver, 5-carboxybenzotriazole silver, 4-sulfobenzotriazole silver and 5-sulfobenzotriazole silver.

Examples of other silver salts having an imino group include imidazole silver, benzimidazole silver, 2-methylbenzimidazole silver, 6-nitrobenzimidazole silver, pyrazole silver, urazol silver, 1,2,4-triazole silver, 1H-tetrazole silver, 3-amino-5-benzylthio-1,2,4-triazole silver, saccharin silver, phthalazinone silver and phthalimide silver, and silver salts of mercapto compound such as 2-mercaptobenzoxazole silver, mercaptooxadiazole silver, 2-mercaptobenzothiazole silver, 2-mercaptobenzimidazole silver, 3-mercapto-4-phenyl-1,2,4-triazole silver, 1-phenyl-5-mercaptotetrazole silver, 4-hydroxy-6-methyl-1,3,3a,7-tetrazaindene silver and 5-methyl-7-hydroxy-1,2,2,4,6-pentazaindene silver.

Examples also include the silver salts of carboxylic acid which decarboxylate at high temperatures described in Japanese Patent O.P.I. Publication No. 211454/1985 and the silver salts of acetylene derivative described in Japanese Patent O.P.I. Publication Nos. 226744/1986 and 231542/1986.

Silver complex compounds having a stability constant of 4.5 to 10.0 as described in Japanese Patent O.P.I. Publication No. 31728/1977 and silver salts of imidazolinethione as described in US Patent No. 4,168,980 can also be used.

Of the organic silver salts mentioned above, silver salts of compounds having an imino group, particularly silver salts of benzotriazole derivatives are preferred, with more preference given to silver salts of benzotriazole, 5-methylbenzotriazole and derivatives thereof, sulfobenzotriazole and N-alkylsulfamoylbenzotriazole.

Other known organic silver salts can be used in the recording material of the present invention.

The organic silver salts described above may be used singly or in combination. They may be used as such after removing soluble salts in an aqueous solution of hydrophilic colloid such as gelatin, or may be used as fine grains of solid obtained by mechanical pulverization and dispersion of the organic silver salt after its isolation. The amount of organic silver salt used is normally 0.01 to 20 g, preferably 0.1 to 5 g per m² of recording material.

For the purpose of acceleration of the reaction of 1,3-sulfur-nitrogen-containing compound and organic silver salt taking place upon heating, promotion of the transfer of the dye formed and other purposes, it is preferable to add a thermal solvent (hot melting substance) to the recording material of the present invention. The thermal solvent is a compound which liquifies upon heating and acts to accelerate the image formation. It is preferably in a solid state at normal temperature, and its melting point is preferably 70 to 170 °C. For use for the present invention, the thermal solvent preferably has the following nature.

Occurs as a white solid at normal temperature and becomes colorless and transparent upon melting.

The heating volatility is minimum.

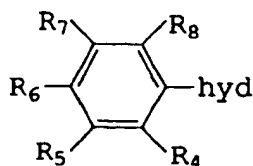
Examples of thermal solvents which can be used for the present invention include the compounds described in US Patent Nos. 3,347,675, 3,438,776, 3,666,477 and 3,667,959, RD No. 17643 and Japanese Patent O.P.I. Publication Nos. 19525/1976, 24829/1978, 60223/1978, 118640/1983, 198038/1983, 68730/1984, 84236/1984, 229556/1984, 14241/1985, 191251/1985, 232547/1985, 52643/1986, 42153/1987, 44737/1987, 78554/1987, 136645/1987, 139545/1987, 53548/1988, 161446/1988, 224751/1989, 227150/1989, 863/1990, 120739/1990 and 123354/1990.

Thermal solvents which are preferably used in the recording material of the present invention are described below.

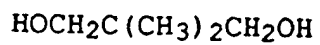
The thermal solvent preferably has an i/o value of not less than 0.5 and not more than 4. Here, the i/o value indicates the degree of organicity or inorganicity of compounds, calculated by the method described in "Kagaku no Ryoiki", vol. 11, pp. 719-725 (1957), published by Nankodo Shuppan.

Compounds which are more preferably used as thermal solvents for the present invention are represented by the following formula 2.

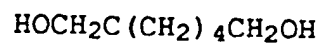
Formula 2



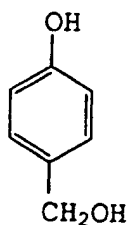
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TS-2

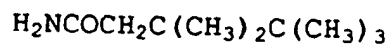


TS-3



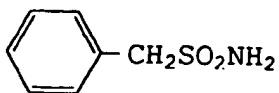
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TS-4



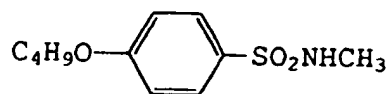
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TS-5



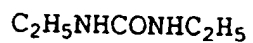
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TS-6



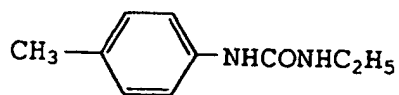
$$i/o=1.25$$

TS-7



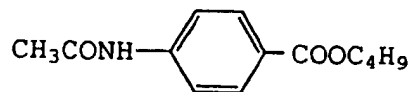
$$i/o=2.2$$

TS-8



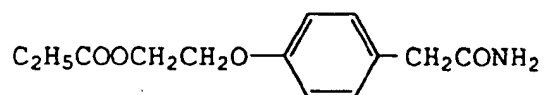
$$i/o=1.2$$

TS-9



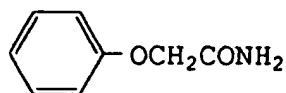
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TS-15



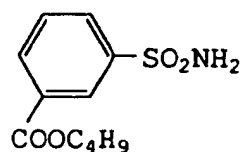
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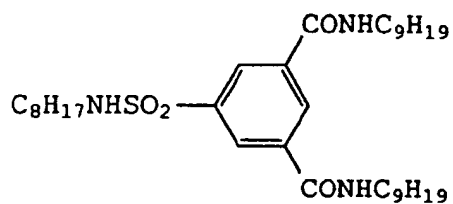
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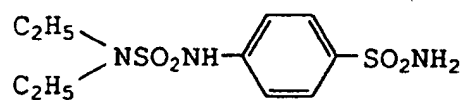
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TS-18



i/o=1.0

TS-19



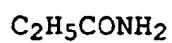
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TS-20



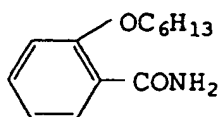
i/o=3.7

TS-21



i/o=3.3

TS-22



i/o=0.9

along with a binder on the support. In such a material, image recording is achieved optically, wherein images are formed upon uniform heating. This type of materials are referred to as heat developable light-sensitive materials.

The heat developable light-sensitive material relating to the present invention is described below.

5 In the heat developable light-sensitive material relating to the present invention, a light-sensitive silver halide is used as the light-sensitive material.

The organic silver salt described above is reduced with a reducing agent as described below under heating conditions. This reaction is accelerated by so-called latent images formed on the exposed fine grains of silver halide. In other words, in the heat developable light-sensitive material, the organic silver salt
10 undergoes reduction in the exposed portion. Taking place concurrently with this reaction, the reaction of 1,3-sulfur-nitrogen-containing compound and organic silver salt is suppressed in the exposed portion.

Consequently, it is possible to cause the reaction of 1,3-sulfur-nitrogen-containing compound and organic silver salt selectively in the unexposed portion, i.e., reverse-imagewise formation of the desired compound is possible.

15 This principle is applicable to the formation of positive images, for instance.

When embodying the present invention as a transfer type heat developable light-sensitive material, for instance, dye transfer occurs in the unexposed portion provided that a dye or a group capable of becoming a dye intermediate is introduced to the substituent for the 1,3-sulfur-nitrogen-containing compound and made non-diffusible and allowed to form a diffusible dye or dye intermediate after reaction with organic
20 silver salt, i.e., positive images can be formed.

The compound released in the reverse-imagewise manner is not necessarily a dye; it may be any PUG, such as a developing inhibitor, fogging agent, developing agent, hardener, developing accelerator or brightening agent for controlling the image formed.

Examples of binders which can be used in the heat developable type light-sensitive material of the
25 present invention include the binders described in Japanese Patent O.P.I. Publication No. 863/1990, line 14, upper right column, through line 10, lower left column, page 10, including preferable combinations thereof. More preference is given to gelatin, polyvinyl pyrrolidone and combinations thereof.

With respect to the silver halide reducing agent, dye providing substance and additive, binder support, image receiving material, constituting the heat developable light-sensitive material, exposure and develop-
30 ment, any material or means can be used. Examples thereof are given in Japanese Patent Application Nos. 256079/1989 (pp. 14-47) and 158931/1990 (pp. 13-41), filed by the present applicants.

Any known conventional light-sensitive silver halide can be used in the heat developable light-sensitive material of the present invention. Examples of such light-sensitive silver halides include silver chloride, silver bromide, silver iodobromide, silver chlorobromide and silver chloriodobromide.

35 The reducing agent used in the heat developable light-sensitive material of the present invention is selected as appropriate out of the known conventional reducing agents in use for heat developable light-sensitive materials according to the developing mechanism and dye formation or release mechanism. The reducing agent referred here includes reducing agent precursors which release a reducing agent upon heat development.

40 The heat developable light-sensitive material of the present invention is used as a black-and-white or color light-sensitive material. When it is used as a color light-sensitive material, a dye-providing material is used.

Although it is of course possible to use the 1,3-sulfur-nitrogen-containing compound of the present invention as a dye-providing material as stated above, it may be used in combination with other dye-
45 providing materials. The 1,3-sulfur-nitrogen-containing compound may be designed to release a photographically useful compound other than a dye and may be used to form a color image in the presence of other dye-providing materials.

Examples of such dye-providing materials include the diffusible dye forming couplers described in Japanese Patent O.P.I. Publication Nos. 44737/1987, 129852/1987 and 169158/1987 and Japanese Patent
50 Application No. 200859/1989, the leuco dye described in Japanese Patent O.P.I. Publication No. 88254/1986 and the azo dyes used for the heat developable dye bleaching method described in US Patent No. 4,235,957. It is preferable to use a dye-providing material which forms or releases a diffusible dye, with more preference given to a compound which forms a diffusible dye upon coupling reaction.

In addition to the substances described above, the heat developable light-sensitive material of the
55 present invention may incorporate various additives as necessary.

The heat developable light-sensitive material of the present invention contains (a) a 1,3-sulfur-nitrogen-containing compound, (b) an organic silver salt, (c) a reducing agent, and (d) a light-sensitive silver halide. When it is used as a color light-sensitive material, it further contains (e) a dye-providing material, which may

recording material. Particularly when the 1,3-sulfur-nitrogen-containing compound releases a dye, a problem of increased fogging is posed.

When a base or base precursor exists during heating, imagewise regulation of the reaction is difficult and image quality deterioration occurs. For example, when the 1,3-sulfur-nitrogen-containing compound releases a dye, fogging is markedly suppressed as a result of acceleration of silver development by the base, but maximum density reduction is also considerable.

Hitherto, 1,3-sulfur-nitrogen-containing compounds have been known to be used in the presence of base. However, in the present invention, the presence of base is unnecessary, on the contrary, the relationship between fog and maximum density improves significantly because 1) reaction is carried out at high temperatures, and 2) the reaction is accelerated by the presence of a thermal solvent.

The advantageous effects of the present invention can be achieved especially noticeably when the formation of image dyes by heat development and the transfer thereof to the image-receiving material are conducted substantially not in the presence of water.

In the present invention, it is preferable to employ a hydrophobic polymer in an image-receiving layer of the image-receiving material.

As hydrophobic polymers, polyvinyl chloride, polycarbonates, polyesters, polyarylates and polystyrene are preferable, and polyvinyl chloride is especially preferable.

When a hydrophilic binder is used in the recording material of the present invention, it is preferable to set the film surface pH of the recording layer at not more than 8.0, more preferably not more than 7.0 at 25°C. The film surface pH of the recording layer is preferably kept within the above-mentioned range both before, during and after heating for image formation.

Here, the film surface pH of the recording layer can easily be measured by dropwise adding a small amount of pure water onto the surface of the recording layer and applying a flat pH electrode thereon. The pure water used for this purpose is ion exchange water or distilled water whose pH is 5 to 8 and whose electroconductivity is not more than 1 $\mu\text{S}/\text{cm}$ at 25°C. Specifically, a microsyringe is used to dropwise add about 10 μl of the pure water onto the surface of the light-sensitive layer, and a flat electrode is applied thereto to obtain measurements.

EXAMPLES

The present invention is hereinafter described in more detail by means of the following examples, but the invention is not by any means limited by them.

Example 1

Preparation of organic silver salt emulsion

While keeping a temperature of 50°C, to an aqueous solution (OA-1) containing 300 g of modified gelatin wherein over 90% of the amino groups have been substituted by phenylcarbamoyl groups, 2400 ml of deionized water, 9.18 g of benzotriazole and 51 ml of 28% aqueous ammonia, 1420 ml of another aqueous solution (OB-2) containing 250 g of benzotriazole and 169 ml of 28% aqueous ammonia and 1420 ml of still another aqueous solution (OC-1) containing 360 g of silver nitrate and 336 ml of 28% aqueous ammonia were added at constant flow rate by the double jet precipitation method using the mixer agitator described in Japanese Patent O.P.I. Publication Nos. 92523/1982 and 92524/1982. During the mixing process, pH and pAg were kept constant at 9.3 and 11, respectively. After completion of addition, a 20% aqueous solution of 60 g of modified gelatin wherein over 90% of the amino groups have been substituted by phenylcarbamoyl groups. Subsequently, 56% acetic acid was added to reach a pH level of 5.5. After precipitation, the dissolved excess soluble salts were removed.

Further, 4800 ml of deionized water was added, and a 10% aqueous solution of potassium hydroxide was added to reach a pH level of 6.0. After 5 minutes of dispersion, a 20% aqueous solution of 30 g of the modified gelatin described above was added. Subsequently, 3.5 N sulfuric acid was added to reach a pH level of 4.5. After precipitation, the dissolved excess soluble salts were removed. After adjusting to a pH level of 6.0 and adding 0.45 g of the following compound ST-1, deionized water was added to reach a total quantity of 2520 ml, followed by 30 minutes of dispersion at 50°C to yield an organic silver salt emulsion.

Preparation of recording material 2

A recording material 2 was prepared in the same manner as with recording material 1 except that silver benzotriazole was not used.

Evaluation

The recording materials 1 and 2 thus obtained were heated by keeping in contact with a 120 °C metal plate for 60 seconds, followed by extraction with a 10:1 mixed solvent of dimethylformamide and water, after which thin-layer chromatography (developing solvent: $\text{CHCl}_3:\text{MeOH} = 8:2$) for evaluation. The recording material 1, which contained silver benzotriazole, yielded a diffusible dye released from the compound 37 of the present invention, while the recording material 2 yielded an unchanged form of the compound 37 of the present invention. It can therefore be said that the use of the recording material of the present invention and a heating means such as a thermal head makes it possible to provide a thermal recording material and a method of image formation using it.

Example 2

Recording materials 1 (b) and 2 (b) were prepared in the same manner as in Example 1 except that the compound 37 of the present invention was replaced with the compound 38 of the present invention for the recording material 1 (b) and silver benzotriazole was not used for the recording material 2 (b).

Heating was followed by extraction in the same manner as in Example 1, and evaluation was made by thin-layer chromatography (developing solvent: hexane:ethyl acetate = 1:2). The results obtained were similar to those obtained in Example 1.

The recording materials 1 (b) and 2 (b) were heated at 120 °C for 60 seconds and then uniformly sprayed with a solution of 1% o-dianisidine in acetic acid. The recording material 1 (b) developed an orange color, while the recording material 2 (b) remained colorless. When the compound (38) was heated in the presence of benzotriazole silver, a thiazolizing ring was presumably cleaved to form a diffusible aldehyde compound.

Example 3

Recording materials 3 through 19 were prepared in the same manner as in Example 1 except that the thermal solvent TS-12 used in Example 1 was replaced with the thermal solvents listed in Table 1 below.

The recording materials 1 through 19 thus obtained were heated by keeping them in contact with a 120 °C hot metal plate for 45 seconds, followed by extraction using the same solvent as in Example 1 and evaluation by thin-layer chromatography.

The results obtained are given in Table 1. The figures for reactivity in Table 1 were obtained on the basis of the size and density of the spots of the compound of the present invention and a diffusible dye resulted from reaction with silver ions on the thin-layer chromatograms. The relationship between reactivity and corresponding spots on thin-layer chromatograms are as follows.

Reactivity (condition of the spot of the compound of the present invention or corresponding aldehyde derivative)

5: The spot of the compound of the present invention disappeared; the diffusible dye alone is present.

4: A thin spot of the compound of the present invention remains; almost the entire spot is assigned to the diffusible dye.

3: The compound of the present invention and the diffusible dye each account for nearly 50%.

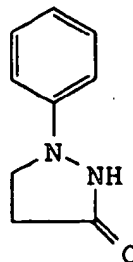
2: Almost the entire spot is assigned to the compound of the present invention; the contribution of the diffusible dye is very small.

1: The spot of the compound of the present invention alone is present; no diffusible dye formation noted.

smaller amount of diffusible compounds corresponding to the compounds 37 and 38 of the present invention in comparison with the unexposed samples.

It can therefore be said that the present invention makes it possible to suggest the potential of the present invention for embodiment as a heat developable light-sensitive material.

Reducing agent 1



Example 5

Preparation of a 1,3-sulfur-nitrogen-containing compound dispersion- 2

1,3-sulfur-nitrogen-containing compound of the present invention, as shown in Table 2 and 180 mg of tricrethylphosphate were dissolved in 1.2 ml of ethylacetate. Then, the solution was mixed with 6.5 ml of an aqueous solution containing 132 mg of the aforesaid surfactant and 150 mg of gelatin. Then, the mixed solution was emulsified and dispersed with a supersonic homogenizer. After that, ethylacetate was distilled off therefrom and deionized water was added to make 10 g in total. Thus, solutions each containing therein 1,3-sulfur-nitrogen-containing compound were prepared.

Table 2

Compound	Addition amount (mg)
(41)	672
(42)	318
(45)	612
(47)	360
(58)	491
(65)	716

Preparation of a reducing agent dispersion

A Dimezone-dispersing solution was prepared by dispersing the mixture of 5.0 g of Dimezone (1-phenyl-4,4-dimethyl-3-pyrazolidone), 5.0 ml of 5 weight % aqueous solution of the above-mentioned surfactant-1 and 40 ml of ion-exchanged water by means of an alumina ball mill. In the same manner as above except that Dimezone was replaced with dimezone-S (4-hydroxymethyl-4-methyl-1-phenyl-3-pyrazolidone), a Dimezone-S dispersion was prepared.

Preparation of heat developable light-sensitive material

Using dispersion prepared as above, an organic silver salt emulsion prepared in Example-1 (silver benzotriazole), a thermal solvent dispersion (TS-12) and a silver iodobromide emulsion (an iodide content of 2 mol %), heat developable light-sensitive materials 101 and 102 were prepared.

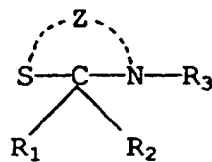
Layer-1	
Gelatin	2.0 g/m ²
Thermal solvent TS-12	Amount described in Table 4
Polyvinyl pyrrolidone	0.02 g/m ²
1,3-Sulfur-nitrogen-containing compound, as described in Table 4	

Layer-2	
Gelatin	3.0 g/m ²
Polyvinyl pyrrolidone	0.02 g/m ²
Thermal solvent TS-12	1.5 g/m ²
Reducing agent, as described in Table 4	
Silver iodobromide	Amount described in Table 4
Silver benzotriazole	Amount described in Table 4
1,2,4-Triazole	24.0 mmol/m ²
Glyoxal	0.1 g/m ²

Claims

1. A method of image formation wherein a recording material is subjected to imagewise heating substantially in the absence of water and a base or precursor thereof, wherein said recording material comprises a support having coated thereon a 1,3-sulfur-nitrogen-containing compound capable of being cleaved in the presence of a silver ion or silver complex ion, an organic silver salt and a thermal solvent, and wherein said 1,3-sulfur-nitrogen-containing compound is represented by the following formula 1

formula 1



wherein R_1 and R_2 independently represent a hydrogen atom, aliphatic group, aromatic group or heterocyclic group; R_3 represents a hydrogen atom, aliphatic group, aromatic group, heterocyclic group or acyl group; Z represents a group of nonmetallic atoms necessary to form a ring, which may have a substituent, wherein at least one of R_1 , R_2 , R_3 and the substituent on the ring represented by Z is a photographically useful group or precursor thereof capable of being released upon reaction with a silver ion or water-soluble silver complex under heating.

2. A method of image formation wherein a recording material is subjected to heating, simultaneously with or after imagewise exposure, substantially in the absence of water and a base or precursor thereof, wherein said recording material comprises a support having coated thereon a 1,3-sulfur-nitrogen-containing compound capable of being cleaved in the presence of a silver ion or silver complex ion, an organic silver salt, a reducing agent, a light sensitive silver halide and a thermal solvent, and wherein said 1,3-sulfur-nitrogen-containing compound is represented by formula 1 as claimed in claim 1.
3. The method of claim 2, wherein said photographically useful group is a dye, developing inhibitor, developing accelerator, fogging agent, coupler, toning agent or brightening agent.
4. A method of image formation wherein a recording material is subjected to heating, simultaneously with or after imagewise exposure, substantially in the absence of water and a base or precursor thereof, wherein said recording material comprises a support having coated thereon a thermal transfer layer containing a 1,3-sulfur-nitrogen-containing compound represented by formula 1 as claimed in claim 1 capable of being cleaved in the presence of a silver ion or silver complex ion, an organic silver salt, a reducing agent, a light sensitive silver halide and a thermal solvent, wherein said photographically useful group is a dye, said compound represented by formula 1 is used as a dye-providing material to form a dye, and the resulting dye is transferred to a image-receiving material.
5. The method of claim 4, wherein formation of the dye and transfer thereof to the image-receiving material are each carried out in the absence of water and a base or precursor thereof.
6. The method of claim 5, wherein said image-receiving material comprises a support having thereon an image-receiving layer containing a hydrophobic polymer.
7. The method of claim 6, wherein said hydrophobic polymer is polyvinyl chloride.
8. The method of claim 5, wherein said thermal solvent is a compound represented by the following formula 2



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(54) **A method of image formation.**

(57) A method of image formation is provided, wherein a recording material is subjected to image-wise heating substantially in the absence of water and a base or precursor thereof, wherein the recording material comprises a support having coated thereon a 1,3-sulfur-nitrogen-containing compound capable of being cleaved in the presence of a silver ion or silver complex ion, an organic silver salt and a thermal solvent, and wherein the 1,3-sulfur-nitrogen-containing compound is represented by the following formula.

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